

NAVAL POSTGRADUATE SCHOOL
Monterey, California

EC 3550

MIDTERM EXAM I

4/00 Prof. Powers

- This exam is closed book and notes; notes on two sides of 8-1/2 x 11 paper are allowed.
- There is a 50 minute time limit.
- There are three problems; each is equally weighted.
- Partial credit will be given; be sure to do some work on each problem.
- Be *sure* to include units in your answers.
- Please circle or underline your answers.
- Do *NOT* do any work on this sheet.
- Show *ALL* work.

1	
2	
3	
Total	

Name: _____

1. Consider a 62.5/125 step-index, multimode fiber with a numerical aperture of 0.250. The index of the core is 1.460. With a certain source, measurements show that this fiber carries 95.4% of its power in the core. Find the frequency of the source (*in THz*).

2. A fiber link consists of five pieces of fiber joined together with ideal splices (i.e., splices with no losses). The fibers have the properties listed below. If the measured power out of the link is $10\text{ }\mu\text{W}$, calculate the input power *in mW and dBm*. (Note: you must use the dB method in your calculation.)

Length [m]	Loss [dB/km]	Bandwidth-distance product [MHz·km]
5,650	0.65	700
6,500	0.72	600
4,600	0.70	750
6,800	0.63	800
10,000	0.35	650

3. Consider a 50/125 graded-index fiber with a numerical aperture of 0.20 and a core index of 1.465. The profile parameter, g , is known to be 98% of the optimum value for this fiber. The fiber is to be used with a source operating at 900 nm with a spectral linewidth of 30 nm. Find the maximum bit rate-distance product for this fiber/source combination *in units of (Mb/s)·km*.

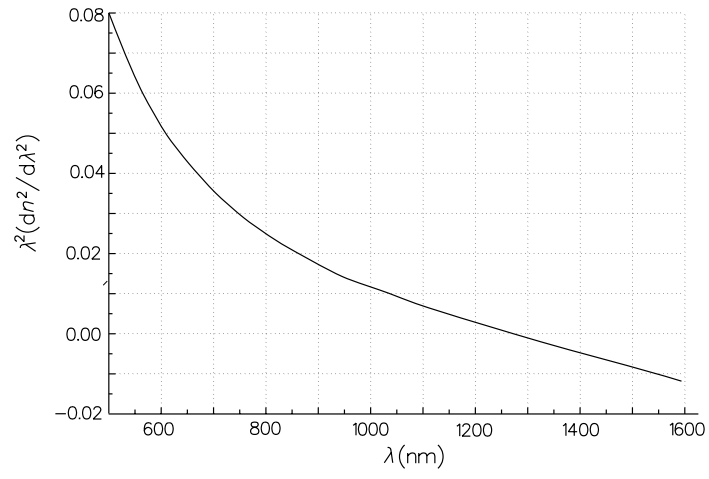


Figure 1: Fig. 3.8 of text

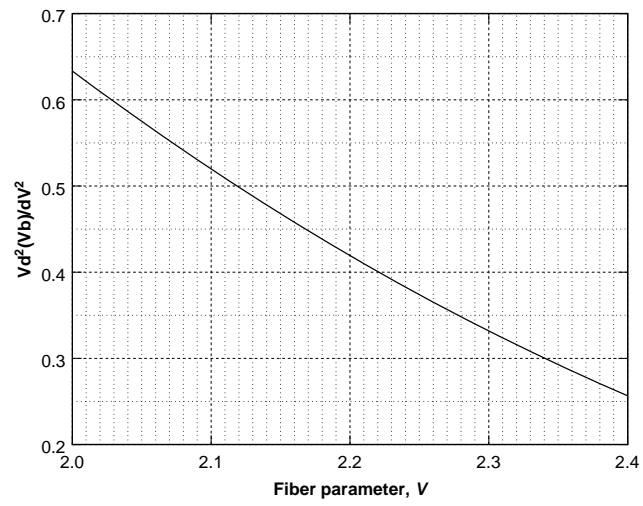


Figure 2: Fig. 3.10 of text